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**HAZARDOUS
SITE
EVALUATION
DIVISION**

Purpose: CERCLA Screening Site Inspection

Site: Golden Eagle Refining Co., Inc.
21000 South Figueroa Street
Carson, California
Los Angeles County

8/1/89

Field Investigation Team Zone II



**CONTRACT NO.
68-01-7347**

ecology and environment, inc.

International Specialists in the Environment

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Site EPA ID Number: CAD060800064

TDD Number: F9-8811-020

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Report Date: August 9, 1989

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1. SITE DESCRIPTION

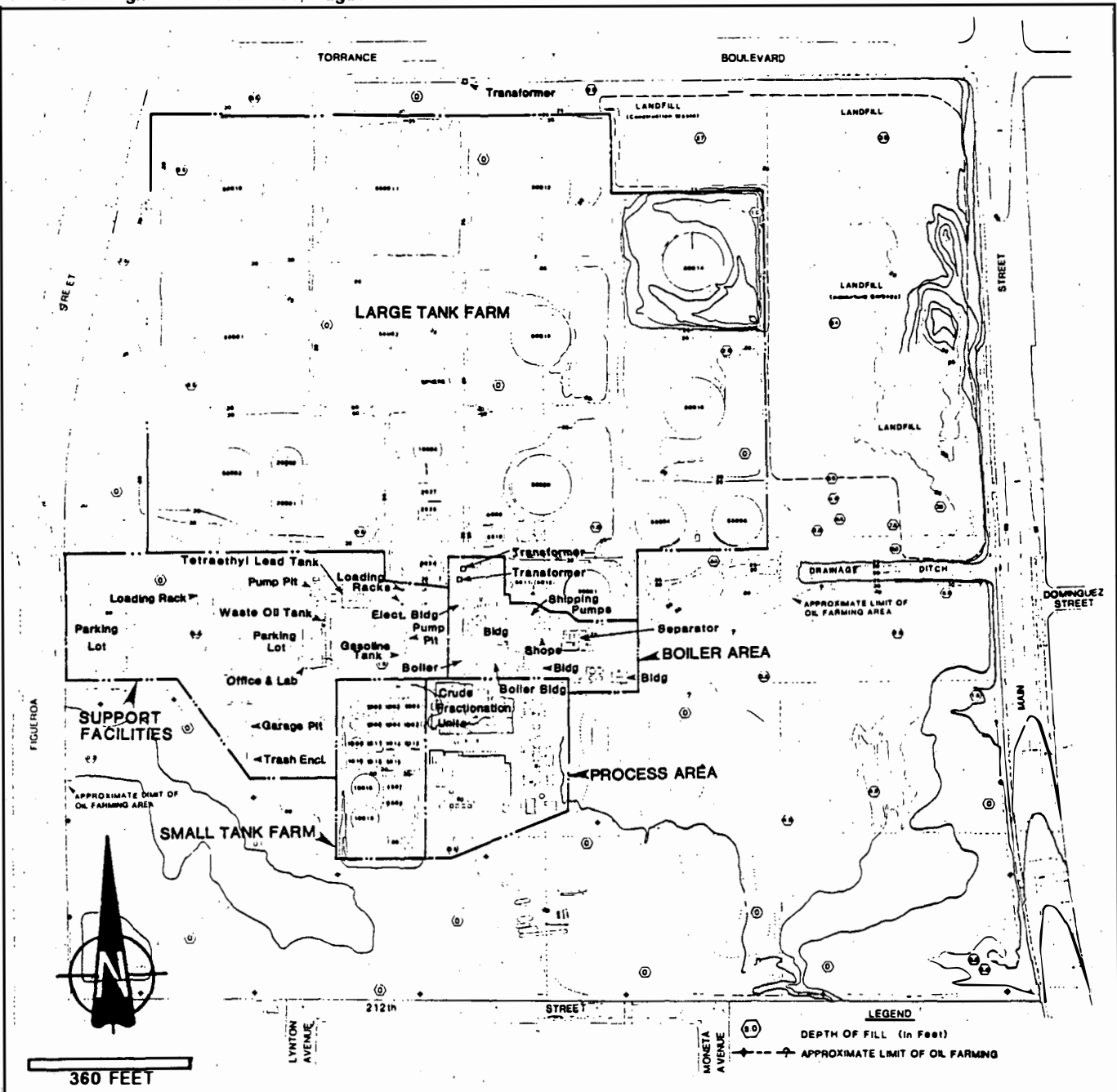
Pursuant to Technical Directive Document number F9-8811-020, Ecology and Environment, Inc.'s Field Investigation Team (FIT) conducted a Screening Site Inspection at Golden Eagle Refining Co., Inc. in Carson, California. This report summarizes FIT's investigative efforts and draws conclusions regarding the site's eligibility for the National Priorities List.

The Golden Eagle Refining Company site (Golden Eagle) is located at 21000 South Figueroa Street in the City of Carson, Los Angeles County, California. The site covers approximately 76 acres. It is bounded on the north by Torrance Boulevard and Gardena Valley Landfills 1 and 2 (currently inactive), on the east by Main Street and several light industrial facilities, on the south by 212th Street and a residential area, and on the west by Figueroa Street and the Harbor Freeway (see Figure 1-1) (1).

The site was the location of an oil refinery from 1945 to 1984. The refinery consisted of large and small tank farm areas, a boiler area, a process area, and support facilities (see Figure 1-2). Tank bottom sludges were "farmed" on about 20 acres in the southern portion of the site. (Land farming is the process by which sludges are spread on the ground, allowed to dry, and then cultivated into the soil for biodegradation.) A public landfill was operated in the northeast corner of the site in the early 1960s. The refinery ceased operations in November 1984. The refinery and tank farm were dismantled and removed in 1985. The landfill was capped and paved over in 1988 (1,2).

The tank farm at the north end of the site was constructed by the Julian Petroleum Company in 1922. In the 1930s, the Douglas Refinery was built north of the site across Torrance Boulevard. It used the tank farm on the Golden Eagle site for crude oil and product storage. In 1945, the Sunset Oil Company built a refinery on the Golden Eagle site south of the tank farm. The facility included two crude oil processing units, each

SOURCE : Bright and Associates, August 1985



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Figure 1-2 FACILITY MAP (PRIOR TO NOV. 1984)
GOLDEN EAGLE REFINING COMPANY
CARSON, CALIFORNIA

consisting of a flash column, fractionation column, and ancillary equipment. At this time, the facility produced kerosene, fuel oil, and gasoline at approximately 4,000 barrels per day. A thermal cracking unit was used between 1953 and 1962 to increase gasoline production. The Golden Eagle Company purchased the refinery from Sunset Oil in 1958. In 1965, the facility stopped producing leaded gasoline and started producing aviation fuel. From 1970 to 1975, the facility was operated under the name of Carson Oil Company. It again became known as the Golden Eagle Refining Company in 1975. A third crude processing unit, with a capacity of 8,500 barrels per day, was added in 1980. The refinery produced JP-4 and JP-5 aviation fuel, fuel oil, and diesel fuel until it stopped refining crude oil in November 1984 (1).

Golden Eagle leased 10 acres in the northeast corner of the site to the Berada Corporation for use as a public landfill from January 1962 to September 1963. The landfill, also known as Gardena Valley Dump No. 5, accepted mostly solid refuse with small quantities of garbage and liquid industrial wastes of unknown composition (1).

2. APPARENT PROBLEMS

A large tank farm was constructed on the north end of the Golden Eagle Refinery site in 1922. A refinery operated on the site south of the tank farm from 1945 to 1984. A Golden Eagle manager estimated that, between 1946 and 1970, an average of 2,000 barrels per year of tank bottom sludges were landfarmed on the southern portion of the site. A small amount of tank bottom sludge was also sprayed on the earthen containment berms surrounding the tank farms. It is not known what was done to the leaded tank bottom sludges prior to 1946.

These sludges consisted of mixtures of petroleum, water, sand, and other sediments (1). Refinery tank bottom sludge is a listed hazardous waste under 40 CFR 261.32. Hexavalent chromium and lead are common constituents of this kind of sludge (40 CFR 261, Appendix VII). In 1970, landfarming operations ceased and facility operators began to send most of the sludge by truck to BKK sanitary landfill or Petroleum Waste, Inc. (1).

Petroleum, including crude oil and its fractions, is not considered a hazardous substance under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 101 (14) and (33). Except for the tank bottom sludges, most of the contamination found at this site is excluded from CERCLA consideration. Benzene, toluene, ethyl benzene, and xylenes are normal constituents of petroleum. Although these compounds will be listed in the analytical results tables, they will not be discussed with respect to groundwater or soil contamination. Chlorinated hydrocarbons are not normal constituents of petroleum and are considered hazardous substances.

In the early 1960s, a public landfill operated on ten acres of the northwest corner of the site. The landfill accepted common household refuse and garbage. Household wastes are not considered hazardous wastes under 40 CFR 261.4(b)(1). Approximately 20,000 gallons of liquid

industrial wastes were also disposed of at the landfill (2). The composition of these industrial wastes is not known, and it is unknown if any of these liquids were hazardous.

In November 1984, Golden Eagle ceased refinery operations at this site with the intent to demolish the refinery and prepare the site for future development. Concurrent with Golden Eagle's demolition and site restoration activities, the Los Angeles Regional Water Quality Control Board (RWQCB) issued Board Order No. 85-17. This order required operators of certain petrochemical facilities to conduct subsurface investigations of their facilities to detect and assess any potential groundwater pollution. Since 1984, several site characterization and mitigation activities have been performed by consultants for Golden Eagle (see Table 2-1).

Initial site characterization work was performed in June 1985 and included the installation of nine on-site monitor wells (MW-10 was drilled in November 1984) (see Figure 2-1). These wells were drilled to 80 or 90 feet and completed in the semi-perched aquifer. Twenty-one soil borings were also drilled at this time. SB-1 through SB-14 were drilled to 15 feet and sampled for hydrocarbons every five feet. SB-15 through SB-21 were drilled to 60 feet and sampled at the 5, 10, 15, 25, 40, and 60 foot depths. In addition, three borings were drilled through the landfill to determine if the groundwater beneath the landfill was contaminated (4).

The results from this initial work showed that two of the wells, MW-2 and MW-8, contained chlorinated hydrocarbons at concentrations greater than California maximum contaminant levels (MCLs) for drinking water or recommended drinking water action levels provided by the California Department of Health Services (DOHS) (see Table 2-2) (4). MW-2 is on the east side of the site, on the edge of the landfill. MW-8 is in the support facilities area of the refinery, near an old underground waste

TABLE 2-1

**SUMMARY OF SITE CHARACTERIZATION ACTIVITIES
GOLDEN EAGLE REFINING CO., CARSON, CALIFORNIA**

Consultant	Report	Sampling	Sample/Well Designation ¹	Soil Analysis				Ground Water/leachate Analyses			
	Date	Date		TPHC ²	Hg, As, Pb ³	Pb ³	P.P. Metals ³	Organics ⁴	TPHC ²	P.P. Metals ³	Organics ⁴
Bright & Assoc.	8/85	6/85-7/85	SB-1 through SB-14 and SB-15 through SB-21; MW-1 through MW-9, plus MW-10 (drilled 11/84); LF-1 through 3 (LF-3 analyzed)	X							
			GP-1 through GP-13 (for combustible gas)	X					X	X	8240/8270
		8/85							X	X	8240/8270
	6/86	4/86	SB-22 through SB-25	X				8240/8270			
	9/86	8/86	SD-1 through SD-32; GER-A through GER-0		X (1 through 7)	X					
						X					
	11/86	10/86	SD-38 through SD-43 (after excavation); BG-1 through BG-6	X							
				X							
Dames & Moore	8/86	7/86	B-1 through B-5; S-1 through S-3 (surface soil)					8240/8310			
						X					
Leroy Crandall & Assoc. for Bright & Associates	9/86	7/86-8/86	MW-11, 12-D, and 13-D (D for deep well @ ~ 200')					8240/8270			

¹ See Figure 2-1 for sampling locations

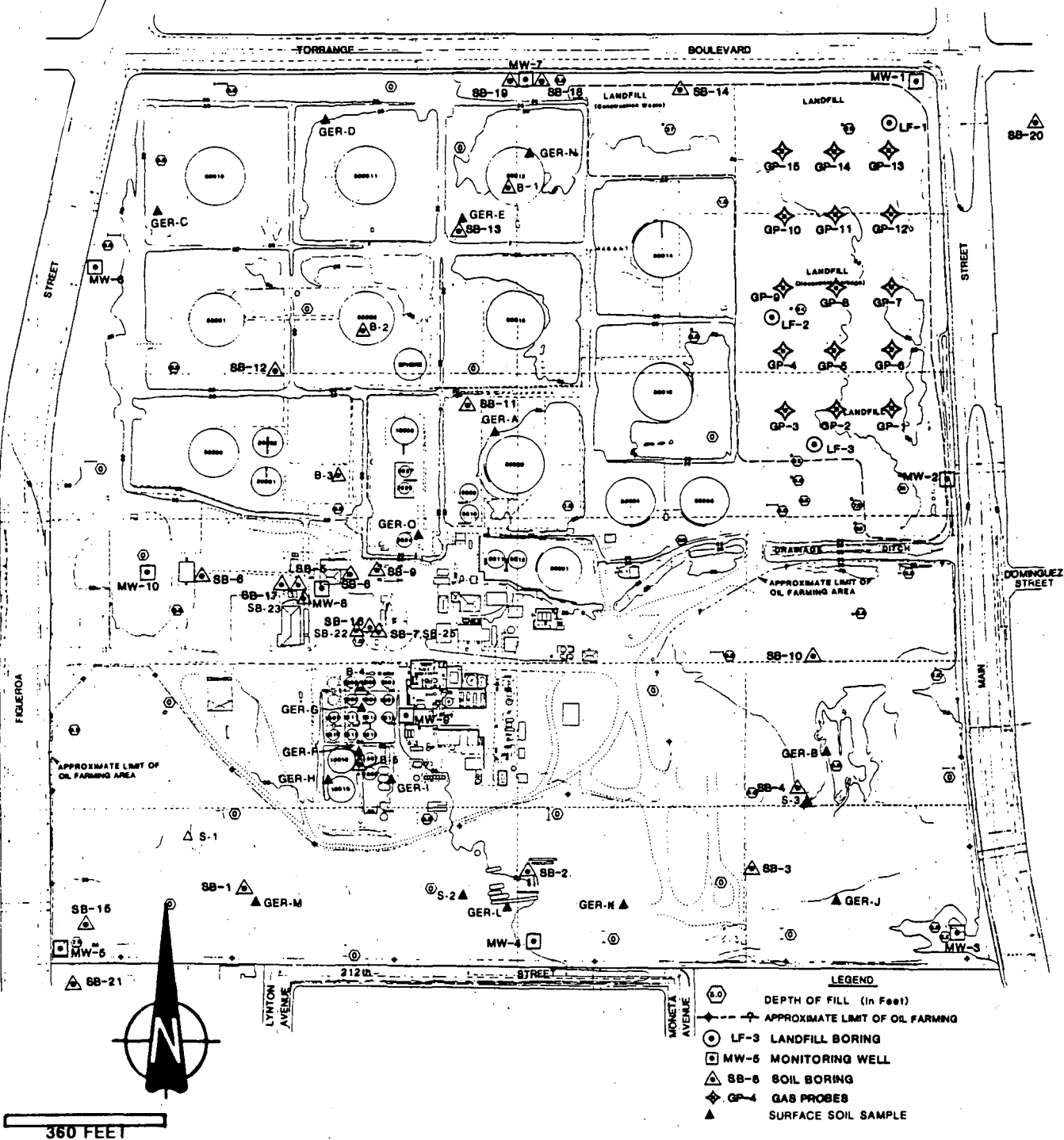
² EPA Method 418.1 or 8015

³ By Atomic Adsorption Spectroscopy

⁴ EPA Methods 8240/8270 (GC/MS) and 8310 (HPLC)

Source: Reference 3

SOURCE : Bright and Associates, August 1985



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Figure 2-1 LOCATION OF MONITORING WELLS, SOIL BORINGS AND GAS PROBES
GOLDEN EAGLE REFINING COMPANY
CARSON, CALIFORNIA

TABLE 2-2

GOLDEN EAGLE REFINING CO., CARSON, CALIFORNIA

PARAMETER		MAXIMUM CONTAMINANT LEVEL	MARCH ¹ 1985	APRIL ² 1987	JULY ³ 1987	OCTOBER ⁵ 1987	FEBUARY ⁶ 1988
<u>MW-1</u>							
Chromium	mg/l	0.05	0.0016	0.002	ND	0.04	0.13 ⁷
Lead	mg/l	0.05	ND	0.0022	0.067	ND	0.03 ⁷
Zinc	mg/l	5.0	ND	0.043	ND	0.21	0.68 ⁷
Methylene Chloride	ug/l	40 ⁸	5	ND	ND	ND	ND
Vinyl Chloride	ug/l	0.5	ND	24	18	ND	30
1,1-Dichloroethane	ug/l	5 ⁸	ND	3	4	ND	20
Trichlorethene	ug/l	5	ND	27	20	2	ND
Tetrachloroethene	ug/l	5	ND	2	1	ND	ND
1,2-Dichloroethane	ug/l	0.5	ND	ND	3	ND	ND
1,1,1-Trichloroethane	ug/l	200	ND	ND	ND	ND	3
TPH	mg/l	---	ND	ND	ND	ND	0.09
<u>MW-2</u>							
Nickel	mg/l	---	0.011	NA	NA	NA	NA
Arsenic	mg/l	0.05	0.003	NA	NA	NA	NA
Chromium	ug/l	0.05	ND	0.001	ND	NA	NA
Lead	mg/l	0.05	ND	0.001	0.059	NA	NA
Zinc	mg/l	5.0	ND	0.036	ND	NA	NA
TPH	mg/l	---	11	ND	ND	NA	NA
Benzene	ug/l	1	53	22	28	NA	NA
Chlorobenzene	ug/l	---	3	ND	4	NA	NA
trans-1,2-Dichloroethene	ug/l	10 ⁸	26	ND	ND	NA	NA
1,2-Dicholopropane	ug/l	5 ⁸	3	ND	ND	NA	NA
Ethylbenzene	ug/l	680	13	6	9	NA	NA
Methylene Chloride	ug/l	40 ⁸	1	ND	ND	NA	NA
Toluene	ug/l	100 ⁸	15	ND	15	NA	NA

TABLE 2-2 (cont'd)

PARAMETER			MAXIMUM CONTAMINANT LEVEL	MARCH ¹ 1985	APRIL ² 1987	JULY ³ 1987	OCTOBER ⁵ 1987	FEBRUARY ⁶ 1988
MW-2 (cont'd)								
Trichloroethene	ug/1	5		12	ND	ND	NA	NA
Vinyl Chloride	ug/1	0.5		20	50	ND	NA	NA
Styrene	ug/1	---		ND	10	ND	NA	NA
Total Xylenes	ug/1	1,750		ND	15	14	NA	NA
1,4-Dichlorobenzene	ug/1	5		ND	13	6	NA	NA
Hexane	ug/1	---		ND	300	ND	NA	NA
Tetrahydrofuran	ug/1	---		ND	ND	19	NA	NA
MW-3								
Chromium	mg/1	0.05		ND	0.016	0.11	0.03	0.13
Lead	mg/1	0.05		ND	ND	ND	ND	ND
Zinc	mg/1	5.0		ND	0.017	0.75	0.24	5.7
TPH	mg/1	---		2	ND	ND	ND	0.10
MW-4								
Chromium	mg/1	0.05		0.0015	0.006	ND	0.06	ND
Lead	mg/1	0.05		ND	ND	0.029	ND	ND
Zinc	mg/1	5.0		ND	0.01	ND	0.31	4.7
1,2-Dichloroethane	ug/1	0.5		ND	1	ND	ND	ND
Toluene	ug/1	100 ⁸		ND	ND	2	ND	ND
Total Xylenes	ug/1	1,750		ND	ND	1	ND	ND
MW-5								
Chromium	mg/1	0.05		0.0035	0.006	0.05	0.06	0.51
Zinc	mg/1	5.0		ND	0.006	ND	0.30	12.2

TABLE 2-2 (cont'd)

PARAMETER		MAXIMUM CONTAMINANT LEVEL	MARCH ¹ 1985	APRIL ² 1987	JULY ³ 1987	OCTOBER ⁵ 1987	FEBRUARY ⁶ 1988
<u>MW-6</u>							
Chromium	mg/l	0.05	0.0077	NA	NA	NA	NA
<u>MW-7</u>							
Chromium	mg/l	0.05	ND	0.004	ND	0.03	0.48
Zinc	mg/l	5.0	ND	0.014	ND	0.27	6.4
TPH	mg/l	---	ND	ND	ND	ND	0.44
<u>MW-8</u>							
Arsenic	mg/l	0.05	0.008	NA	NA	NA	NA
TPH	mg/l	---	3	NA	NA	NA	NA
Benzene	ug/l	1	240	NA	NA	NA	NA
trans-1,2-Dichloroethene	ug/l	10 ⁸	13	NA	NA	NA	NA
1,2-Dichloroethane	ug/l	0.5	18	NA	NA	NA	NA
Methylene Chloride	ug/l	40 ⁸	2	NA	NA	NA	NA
Trichloroethene	ug/l	5	4	NA	NA	NA	NA
<u>MW-9</u>							
Chromium	mg/l	0.05	0.0054	NA	NA	NA	NA
<u>MW-11</u>							
Chromium	mg/l	0.05	NA	0.006	ND	ND	ND ⁷
Lead	mg/l	0.05	NA	ND	ND	ND	0.13 ⁷
Zinc	mg/l	5.0	NA	0.016	ND	ND	0.22 ⁷
TPH	mg/l	---	NA	ND	ND	ND	0.24

TABLE 2-2 (cont'd)

PARAMETER		MAXIMUM CONTAMINANT LEVEL	MARCH ¹ 1985	APRIL ² 1987	JULY ³ 1987	OCTOBER ⁵ 1987	FEBUARY ⁶ 1988
MW-12D							
Chromium	mg/l	0.05	NA	ND	ND	0.05	0.20
Lead	mg/l	0.05	NA	ND	ND ⁴	ND	ND
Zinc	mg/l	5.0	NA	0.015	0.64	0.27	12.3
TPH	mg/l	---	NA	ND	ND	ND	0.13
Toluene	ug/l	100 ⁸	NA	ND	ND	ND	2
Total Xylenes	ug/l	1,750	NA	ND	ND	ND	1
MW-13D							
Chromium	mg/l	0.05	NA	ND	ND	0.02	0.20
Lead	mg/l	0.05	NA	0.0021	0.04 ⁴	ND	ND
Zinc	mg/l	5.0	NA	0.032	ND	0.21	12.3
TPH	mg/l	---	NA	6	ND	ND	0.16

¹ From Bright and Associates, August 1985.

² From Bright and Associates, Quarterly Monitoring Report to RWQCB, 4/14/87.

³ From Bright and Associates, Quarterly Monitoring Report to RWQCB, 7/22/87.

⁴ Resampled 7/29/87.

⁵ From Bright and Associates, Quarterly Monitoring Report to RWQCB, 12/16/87.

⁶ From SCS Engineers, Quarterly Monitoring Report to RWQCB, 5/20/88.

⁷ Resampled 4/25/88.

⁸ DOHS Recommended Action Level.

ND = Not Detected

NA = Not Available

mg/l = milligrams per liter

ug/l = micrograms per liter

BOLD Nos. = values exceed MCL or Action Level.

oil tank. A soil boring near MW-8 also contained high levels of chlorinated hydrocarbons to a depth of 40 feet (see Table 2-3) (3). It is not known what refinery operations may have released chlorinated hydrocarbons to the soil.

Total petroleum hydrocarbons were found in the soil sample from 65 feet at MW-5 at 4,200 parts per million (ppm) (see Table 2-4) (4). MW-5 is in the southwest corner of the site, in the landfarming area.

In 1986, three additional monitor wells were installed in the landfarming area. Two of these wells were drilled to about 190 feet and screened from 150 to 190 feet. The purpose of these wells was to determine the permeability of the layer of sediments between the semi-perched and Gage aquifers, and to detect any downward migration of contaminants into the Gage aquifer. Samples from these wells contained levels of chromium and zinc that exceeded the MCLs for these compounds. Also, total petroleum hydrocarbons were detected in groundwater samples collected in February 1988.

Three surface soil samples were collected in the landfarming area and analyzed for metals contamination (see Table 2-5). One sample contained high levels of arsenic, mercury, and lead, prompting additional surface soil sampling. Four of these samples contained lead in excess of the Total Threshold Limit Concentration (TTLC) of 1,000 ppm. The TTLC is the concentration of a persistent and bioaccumulative toxic substance at which a waste is considered "hazardous", according to section 25141 of the California Health and Safety Code. At one location where surface soil concentrations exceeded the TTLC, samples were collected at one and two foot depths and analyzed for lead. The lead concentrations for these samples were 93 and 18 ppm, respectively.

The mitigation activities on-site included the removal of equipment and subsurface structures. Hydrocarbon-contaminated soils were treated using bioaugmentation. Lead-contaminated soils were excavated and removed to an unknown disposal site. A gas migration control system and final cover were constructed for the landfill (9).

TABLE 2-3

CONCENTRATIONS OF ORGANIC PRIORITY POLLUTANTS DETECTED IN SELECTED SOIL SAMPLES
GOLDEN EAGLE REFINING CO., CARSON, CALIFORNIA

CHEMICAL	SB-23-2 @ 5'	SB-23-5 @ 20'	SB-23-9 @ 40'	SB-24 @ 20'	SB-25 @ 20'	B-2 @ 10'
1,1-Dichloroethene	76,600	3,600				
Benzene		197				
Methylene Chloride			5,060			
Toluene	45	21,900	72	52	30	12,000
Ethyl Benzene		16,800	133	140	107	2,500
Tetrachloroethene		165				
1,1,2,2-Tetrachloroethene	205	296	165			
Total Xylenes						12,000

From Bright and Associates, June 1986, except for B-2 which is from Dames and Moore, August 1986. EPA Methods 8240 and 8270. Concentrations in ug/kg.

TABLE 2-4

HYDROCARBON CONCENTRATIONS IN SOIL FROM BORINGS AND MONITOR WELLS
GOLDEN EAGLE REFINING CO., CARSON, CALIFORNIA

SAMPLE LOCATION	SAMPLE DEPTH						
	5 FEET	10 FEET	15 FEET	25 FEET	40 FEET	60 FEET	65 FEET
SB-1	<10	<10	<10	---	---	---	---
SB-2	16	20	16	---	---	---	---
SB-3	14	28	20	---	---	---	---
SB-4	26	22	14	---	---	---	---
SB-5	1,800	1,700	6,300	---	---	---	---
SB-6	20	83	58	---	---	---	---
SB-7	93	7,700	8,000	---	---	---	---
SB-8	20	32	16	---	---	---	---
SB-9	<10	<10	<10	---	---	---	---
SB-10	11	<10	<10	---	---	---	---
SB-11	<10	<10	<10	---	---	---	---
SB-12	16	<10	<10	---	---	---	---
SB-13	36	<10	<10	---	---	---	---
SB-14	3,600	<10	<10	---	---	---	---
SB-15	6	28	48	98	120	62	---
SB-16	23	970	56	<0.1	4	17	---
SB-17	<0.1	<0.1	<0.1	<0.1	6	<0.1	---
SB-18	23	51	29	130	10*	6	---
SB-19	19	37	40	160	97	76**	---
SB-20	34	35	160	35	150	120	---
SB-21	115	36	178	61	35	110	---

* Sample taken at 45'

** Sample taken at 55'

From Bright and Associates, August 1985.

TABLE 2-4 (cont'd)

HYDROCARBON CONCENTRATIONS IN SOIL FROM BORINGS AND MONITORING WELLS
GOLDEN EAGLE REFINING CO., CARSON, CALIFORNIA

SAMPLE LOCATION	SAMPLE DEPTH						
	5 FEET	10 FEET	15 FEET	25 FEET	40 FEET	60 FEET	65 FEET
MW-1	<10	<10	<10	<10	<10	---	<10
MW-2	410	290	21	270	<10	<10	---
MW-3	110	160	23	13	<10	<10	---
MW-4	34	<10	<10	<10	<10	---	13
MW-5	4,100	4,200	15,000	<10	4,500	33	4,200
MW-6	2,200	<10	41	<10	<10	---	<10
MW-7	520	7,600	13,000	<10	<10	13	---
MW-8	220	11	760	80	22	---	18
MW-9	330	72	<10	<10	<10	---	<10

* Sample taken at 45'

** Sample taken at 55'

From Bright and Associates, August 1985.

TABLE 2-5

SUMMARY OF METAL CONCENTRATIONS IN SURFACE SOIL SAMPLES¹
GOLDEN EAGLE REFINING CO., CARSON, CALIFORNIA

METAL	SAMPLE I.D.		
	S-1	S-2	S-3
Arsenic	9.0	5.8	75
Barium	373	262	3,180
Cadmium	<1	1.1	2.3
Chromium (total)	25	52	183
Cobalt	10	15	17
Copper	24	54	169
Lead	195	277	1,900
Mercury	0.51	0.54	3.9
Nickel	18	60	45
Vanadium	35	57	60
Zinc	95	186	346

¹ From Dames and Moore, August 1986. EPA-CLP Protocol. Concentration in mg/kg.

The demolition of the refinery and removal of subsurface structures was performed under permits from the City of Carson and the South Coast Air Quality Management District (SCAQMD). According to Bright and Associates, consultants for Golden Eagle, hazardous materials, such as transformers containing traces of PCB's and asbestos insulation, were removed and properly disposed of (details unknown) (6).

Bright and Associates estimated that 23,700 cubic yards of hydrocarbon-contaminated soil needed to be either treated or removed. This estimate included soil from the support facilities area, tank farms, and the landfarming area. Rather than excavating and disposing of this soil off-site, Golden Eagle received a variance from the DOHS to treat the soil using in-situ bioaugmentation (7). SOLMAR Corporation was retained to perform the treatment. Four areas were set up to be treated (see Figure 2-2). The asphaltic material that covered the berms surrounding the tank farms was scraped into the interior of the large tank farm (treatment area 1). The interior diking of the tank farm area was graded and disked into the surrounding area. All visibly contaminated soil from 10 locations throughout the processing and support areas (treatment areas A through J) was excavated and spread into the large tank farm area. Additional soil removed and placed in the large tank farm area included soil to a depth of five feet around MW-5, MW-6, MW-7, and SB-14, and soil to a depth of 25 feet at SB-5 and SB-7 near the location of the former underground storage tanks in the support facilities area. The bioaugmentation process involved the addition of nutrients and bacteria specifically cultured to digest the hydrocarbons present in the soil (8).

In addition to the bioaugmentation of hydrocarbon-contaminated soils, approximately 194 cubic yards of soil containing elevated levels of lead were removed from a portion of the landfarming area. An area measuring about 112 feet by 112 feet by 5 inches was excavated and disposed of off-site (disposal location unknown) (9).

SOURCE : Bright and Associates, August 1985

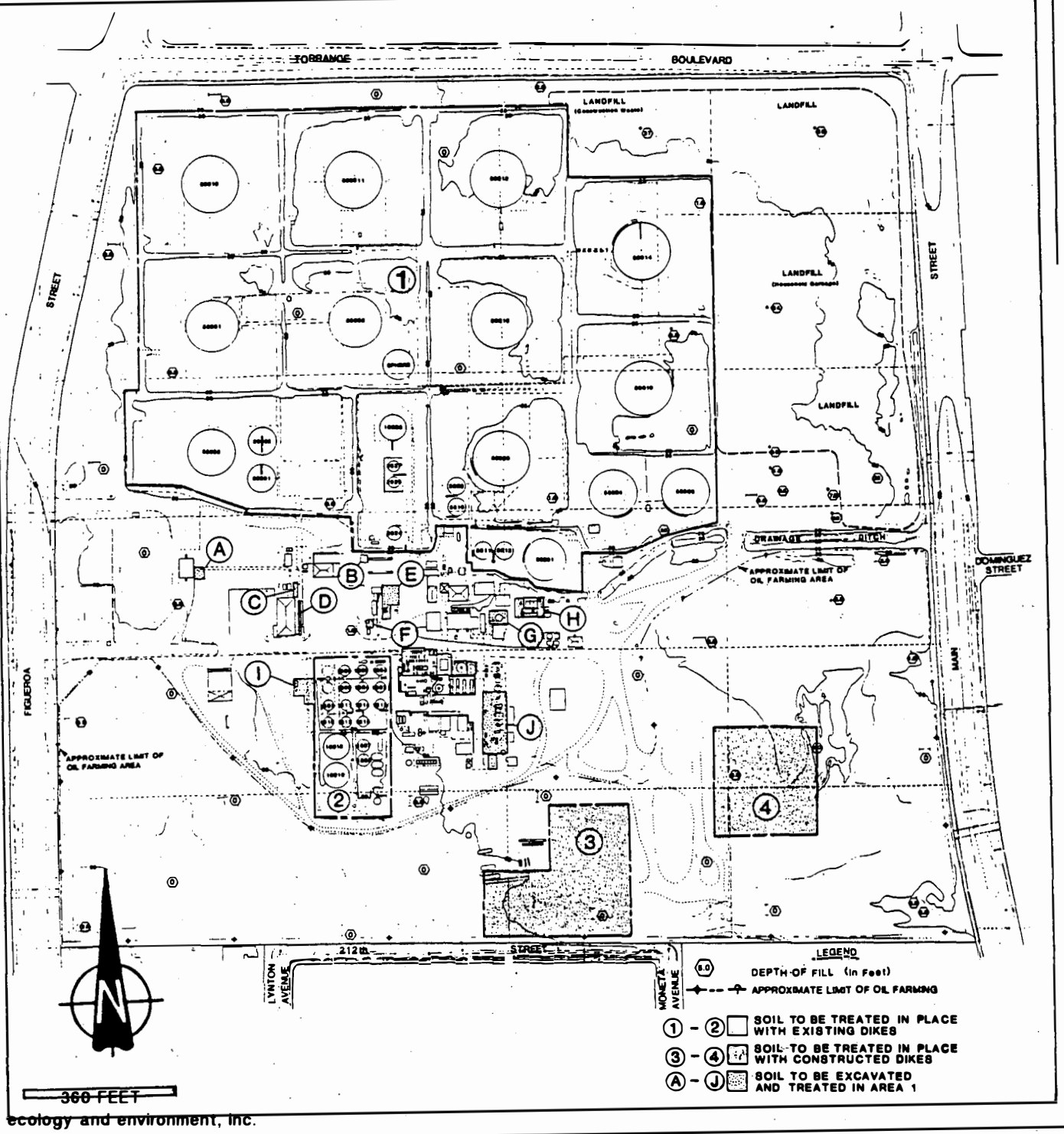


Figure 2-2 BIOAUGMENTATION TREATMENT AREAS
GOLDEN EAGLE REFINING CO.
CARSON, CALIFORNIA

According to Golden Eagle, RWQCB, and the City of Carson, the site has been sufficiently characterized and remediated to permit development as a light industrial park (10,11,12). DOHS does not agree and is currently trying to get Golden Eagle to sign a consent order to provide for further characterization work to be performed (13).

Bright and Associates concluded that the biotreatment of the hydrocarbon-contaminated soils was successful, although the analytical results do not support this conclusion (8). They claim that total petroleum hydrocarbon concentrations were reduced by the biotreatment process. Only two of the six sampling locations demonstrated a trend of continuing hydrocarbon reduction. They also stated that only traces of volatile priority pollutants remained. Methylene chloride was present, after treatment, at a concentration of 800 micrograms per kilogram ($\mu\text{g/kg}$), which is more than four times the level recommended by the RWQCB for the protection of groundwater resources ($190 \mu\text{g/kg}$) (5).

In addition to the effectiveness of the treatment, the scope of the treatment may also be inadequate. High levels of total petroleum hydrocarbons were found to 65 feet in MW-5 and to 15 feet at MW-7 and SB-14 (at the north end of the site), but only the top 5 feet were excavated and spread into the treatment area. Bright and Associates contend that the hydrocarbons that remain are long-chained, asphaltic hydrocarbons which "have no migration potential and pose no environmental threat" (6). These asphaltic hydrocarbons are relatively insoluble and less easily degraded than short-chain hydrocarbons, including most volatile priority pollutants. However, these long-chain hydrocarbons can eventually breakdown and migrate off-site. The presence of petroleum hydrocarbons at 65 feet demonstrates the migratory potential of these hydrocarbons.

In March 1985, trans-1,2-dichloroethene and 1,2-dichloroethane were found in MW-8 at levels greater than their MCLs or action levels (4). Methylene chloride and trichloroethene (TCE) were also detected. MW-8 is located in the support facilities area just east of the old waste oil tank location. It is not known what refinery process would account for

the presence of chlorinated hydrocarbons at this location. RWQCB did not include MW-8 in their order for long term groundwater monitoring at the site (Board Order 87-12), because they were only interested in off-site contaminant migration that would be observed in the perimeter wells (11). For this reason, MW-8 has not be sampled since March 1985.

RWQCB also instructed Golden Eagle that mitigation of the groundwater contamination would not be necessary if it could demonstrate that the contaminants in the semi-perched aquifer posed no threat to usable water supplies (6). Bright and Associates, on behalf of Golden Eagle, contend that there is a 24 to 26 foot aquitard beneath the site that prevents the downward migration of contaminants (14). Using the same data, FIT believes that the semi-perched and Gage aquifers are sufficiently interconnected to allow the contaminants in MW-8 to eventually reach the Gage aquifer (see Section 3.3 Groundwater). Samples collected from the monitor wells completed in the Gage aquifer indicate that contamination may already be migrating into that aquifer.

3. HRS FACTORS

3.1 OBSERVED RELEASE

There is evidence to suggest that an observed release of hazardous substances to groundwater may be documented from this site, although the documentation is incomplete at this time. Samples collected by Bright and Associates for Golden Eagle indicate that the semi-perched aquifer is contaminated with chlorinated hydrocarbons and metals that possibly emanated from this site. No off-site background samples were collected and these data have not been confirmed. Within 3 miles of this site, hydraulic interconnection between the semi-perched and the drinking water aquifers has been documented (see Section 3.3 Groundwater).

Golden Eagle installed 13 monitor wells on-site as part of their site characterization efforts. The wells were sampled in March 1985, April, July, and October 1987, and February 1988. Samples from 10 of the 13 wells, including the two wells in the Gage aquifer, had concentrations of priority pollutants (chlorinated hydrocarbons or metals) that exceeded either their MCLs or DOHS action levels.

Due to the northwest to southeast water-level gradient of the semi-perched aquifer, MW-6 and MW-7 are background wells for the support facilities area of the site (see Figure 3-1). None of the samples from either well contained detectable concentrations of chlorinated hydrocarbons. MW-1 is located in the northeast corner of the site and is also upgradient of the site. Samples from this well contained vinyl chloride, trichloroethene, 1,1-dichloroethane, and 1,2-dichloroethane at concentrations greater than their MCLs or DOHS action levels. Other chlorinated hydrocarbons were detected in the samples. There are several former waste management areas (landfills) in the vicinity of Golden Eagle that may be contributing to the contamination of the semi-perched zone (1,2). For this reason, it may be difficult to attribute contamination found in the semi-perched aquifer to the Golden Eagle facility. No samples from upgradient wells completed in the Gage aquifer were available for comparison to the deeper wells on-site.

SOURCE : SCS Engineers, 1988

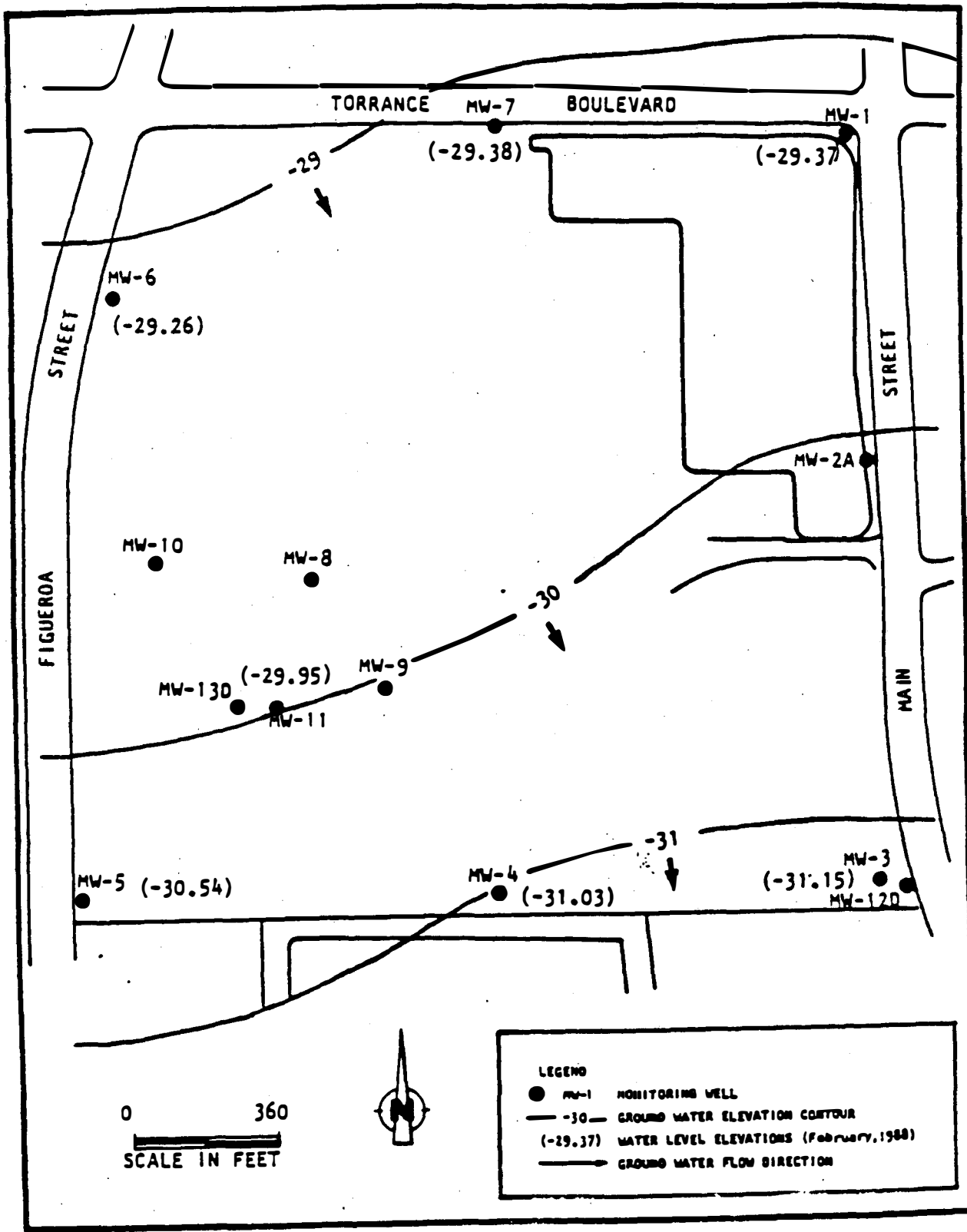


Figure 3-1 SEMI-PERCHED GROUNDWATER CONTOURS - FEBRUARY 1988
GOLDEN EAGLE REFINING COMPANY
CARSON, CALIFORNIA

There has been no observed release of hazardous wastes to surface water from this site. In 1961, as part of the landfill operations, an unlined drainage channel was constructed through the center of the site. All rainwater runoff from the site was collected and discharged through this channel. The discharge was sampled and met the requirements established in the facility's National Pollutant Discharge Elimination System (NPDES) permit before flowing off-site into the storm drain system. About one mile east of the site, the storm drain enters the Dominguez Channel, a concrete-lined channel used only for flood control. Much of the contaminated surface soils have been treated or removed, but it is not known if this remediation has been sufficient to prevent future releases of hazardous wastes to surface water.

There has been no observed release of contaminants to air from this site. During refinery operations, emissions were regulated under permits from the SCAQMD. Demolition activities in 1985 and 1986 were conducted in accordance with SCAQMD rules pertaining to the generation of dust, asbestos, and hydrocarbon emissions (4). It is not known if there could be any future releases of contaminants to air from the contaminated soils at this site.

3.2 WASTE TYPE AND QUANTITY

A Golden Eagle manager estimated that, between 1946 and 1970, an average of 2,000 barrels per year of tank bottom sludges were landfarmed on the southern portion of the site. This amounts to approximately 50,000 barrels of hazardous waste having been disposed of on-site. Refinery tank bottom sludge is a listed hazardous waste under 40 CFR 261.32. Hexavalent chromium and lead are common constituents of this kind of sludge (40 CFR 261, Appendix VII).

Elevated lead concentrations were found in surface soil samples throughout the landfarm area, which covers the southern one-third of the site. An area of approximately 1,800 square feet in the eastern portion of the landfarm area had lead concentrations that exceeded the TTLC for

lead of 1,000 ppm. Arsenic, chromium, and mercury concentrations in this area were well below the TTLCs for these compounds (14). During mitigation activities, approximately 194 cubic yards of soil containing elevated lead concentrations were removed from a portion of the landfarming area. An area measuring 112 feet by 112 feet by 5 inches was excavated and disposed of off-site (9).

In addition to the metals found in tank bottom sludges, soil and groundwater samples from the support facilities area of the refinery show contamination with several chlorinated hydrocarbons. It is unknown what refinery process could be responsible for these contaminants or in what quantities they were generated or disposed of.

3.3 GROUNDWATER

The Golden Eagle site lies within the West Coast Basin of the Coastal Plain. The topography of the basin consists of a gently sloping, poorly drained plain. This plain is flanked by the partly eroded highland areas of the Newport-Inglewood uplift and the heavily eroded Palos Verdes Hills (16).

Sediments of the Lakewood and San Pedro formations of the Pleistocene age underlie the site. In this area, the Lakewood formation includes the semi-perched aquifer, the Bellflower aquiclude, and the Gage aquifer. The Lynwood and Silverado aquifers compose the San Pedro formation (see Figure 3-2).

Based on information gathered from the logs of the 13 monitor wells drilled on-site, the semi-perched aquifer, both the saturated and unsaturated zones, consists predominantly of sandy to clayey silt with interbedded layers of silty sand and silty clay (15). The depth to water in the semi-perched aquifer ranged between 54 and 66 feet below ground surface in February 1988 (2). Due to large variations in surface elevation, these depths translate to groundwater elevations between 29 and 31 feet below mean sea level.

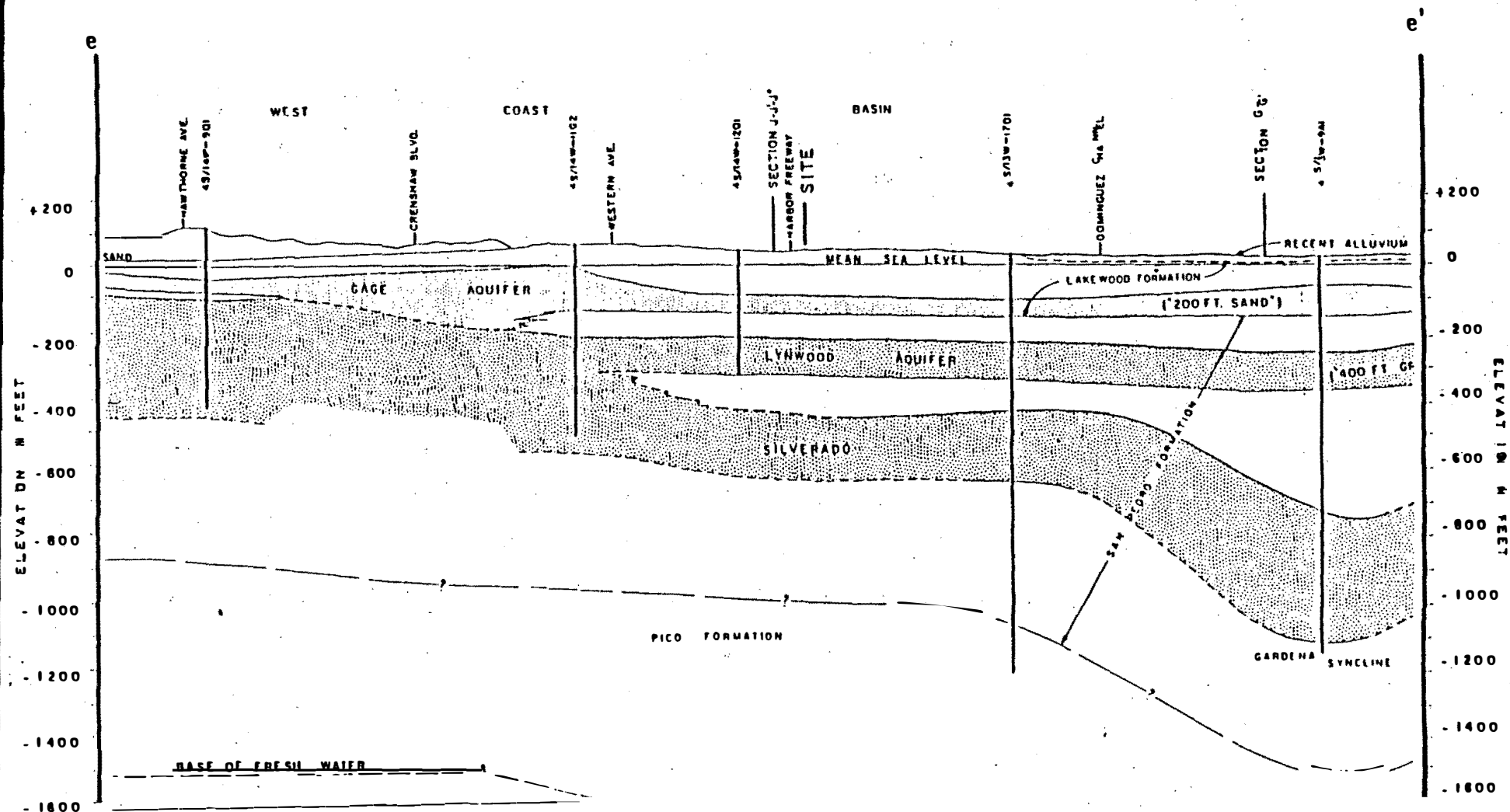


Figure 3-2 GEOLOGIC CROSS SECTION
GOLDEN EAGLE REFINING COMPANY
CARSON, CALIFORNIA

There is a 24 to 26 foot interval of layered clayey sand, silt, and silty clay beneath the semi-perched aquifer beginning at about 115 feet below land surface. This layer is often referred to as the Bellflower aquiclude. In the two deep wells installed on-site, the permeability of this material ranged from 4.09×10^{-5} centimeters per second (cm/sec) to 1.9×10^{-7} cm/sec (15). Although these layers may limit the interchange of water between the semi-perched and Gage aquifers, based on these permeabilities, they do not represent an impermeable boundary (2).

The Gage aquifer, also known as the "200-foot sand" is composed chiefly of sand with minor amounts of gravel and thin beds of silt and clay. The log of a boring drilled for the Del Amo Expanded Site Inspection (EPA ID Number CAD029544731) about one-half mile northwest of Golden Eagle shows that this aquifer extends to a depth of about 245 feet. At this boring, a layer of fat clay approximately 14 feet thick lies beneath the Gage aquifer (17).

The Lynwood aquifer, previously known as the "400-foot gravel," consists mainly of sand and sandy silt. The Silverado aquifer is composed of fine to coarse-grained sands and gravels that are occasionally interbedded with discontinuous layers of sandy silt, silt, and clay. The Lynwood is about 100 feet thick in this area; the Silverado is about 300 feet thick (16).

The combined Lynwood/Silverado aquifer is believed to merge with the overlying Gage aquifer on the northern flank of the Palos Verdes Hills (16). A boring was drilled during the Del Amo ESI at the Torrance High School, 2.1 miles southwest of Golden Eagle. At this boring, no clay layer was found beneath the Gage. The drilling performed for the Del Amo ESI, in addition to the permeabilities of the two on-site deep wells, indicate that the semi-perched aquifer is hydraulically interconnected with the Gage and Lynwood/Silverado aquifers within three miles of the Golden Eagle site.

The mean seasonal (November through April) rainfall at the site is approximately 16 inches. The mean seasonal evaporation is about 17 inches. This yields a mean seasonal net precipitation to the site of approximately negative 1 inch (18).

The closest drinking water well to the site is the Dominguez Water Company well #19 (19). It is located near the intersection of Carson Street and Delores Avenue, approximately one-half mile southeast of the site. The well is 1050 feet deep and is screened in the Silverado aquifer (between 504 and 660 feet). Dominguez Water Company well #75 is located about 2.5 miles from the site at the northeast corner of Main and Lomita Streets. This well is perforated between 196 and 410 feet deep, and draws water from the Gage and Lynwood aquifers. Water from these wells are blended with other well water and delivered through the Dominguez Water Company distribution system to a population of about 110,000 people. At present, no water quality problems have been detected in either well. Should the wells become contaminated, a potential alternative source of water is available from the Metropolitan Water District of Southern California (20).

Several priority pollutants, including chlorinated hydrocarbons and metals, have been detected in the groundwater of the semi-perched aquifer. During the sampling in February 1988, samples from the two wells drilled into the Gage aquifer, MW-12D and MW-13D, showed concentrations of chromium and zinc that exceeded MCLs. These samples also had detectable concentrations of total petroleum hydrocarbons (2). No on-site wells are deep enough to detect contamination of the Lynwood or Silverado aquifers. Due to the nature of the aquifer interconnection and the quantity of wastes deposited at the site, it may be possible for contaminants from this site to eventually contaminate the drinking water supply.

3.4 SURFACE WATER

There are no surface water targets within 3 miles of this site. The major surface water drainage through the area is the Dominguez Channel.

It runs in a southeasterly direction approximately one mile northeast of the site. This concrete-lined channel is only used for flood control (21). Approximately seven miles downstream from the site, the channel enters the Pacific Ocean at the East Basin of Los Angeles Harbor.

The site is relatively flat. Site elevation ranges from about 22 to 33 feet above sea level (2). The 1-year, 24-hour rainfall for this area is about 2 inches (23).

An unlined drainage channel was constructed on-site as part of the landfill operations in the early 1960s. All rainwater collected on-site was directed into this channel. Oil absorbing material was placed in part of the channel to help prevent off-site migration of hydrocarbons (10). Before leaving the site, the water was tested for compliance with the refinery's NPDES permit. Results from these tests show that the discharge was almost in full compliance with the permit.

Much of the contaminated surface soil has been either treated in place or removed. It is unknown if these remedial actions have been sufficient to prevent an observed release of contaminants to surface water from this site.

3.5 AIR

There has been no documented release of contaminants to air from this site. Golden Eagle Refinery ceased operations in November 1984. All refinery equipment and storage facilities were removed in 1985 in accordance with regulations and standards of the EPA, Occupational Safety and Health Administration, DOHS, and SCAQMD (1).

It is not clear if the cleanup of surface soils contaminated with hydrocarbons or metals has been sufficient to prevent an observed release of contaminants to air from this site.

3.6 PROPOSED REVISED HRS CONSIDERATIONS

There are several factors about this site that will be assessed differently under the proposed revised Hazard Ranking System (rHRS).

For the groundwater migration pathway, aquifer interconnection must be shown within two miles of the contaminant source. The work from the Del Amo ESI shows interconnection between the Gage and Lynwood aquifers 2.1 miles from the site. Without further evidence showing interconnection closer to the site, the Dominguez Water Company well #19 can not be used to determine the drinking water target population. Well #75 draws water from the Gage aquifer and can be used in the proposed model, but contaminant dilution over the 2.5 mile distance will reduce the potential hazard to the drinking water target population as modeled in the rHRS.

In the rHRS, the surface water migration pathway addresses the risks to people, resources, and the environment by evaluating four types of threats: drinking water threat, human food chain threat, recreational threat, and environmental threat. The distance from the site that the threat is to be evaluated has increased from 3 miles to 15 miles. The Dominguez channel extends approximately seven miles from the probable point of contaminant entry to the Pacific Ocean. Therefore, the threat to the fishery and recreational resources from a release of contamination from the Golden Eagle site must be considered in an 8-mile radius of ocean. There are both commercial and sport fisheries for clams, crabs, spiny lobster, grunion, and halibut within this radius. None of these species are endangered or protected under federal or state laws (22). Recreational activities in the area include sailboarding, sailing, and scuba diving.

Reportedly, the site is completely surrounded with a chain-link fence and barbed-wire to restrict access to the site. During the FIT site inspection on March 30, 1989, a dog was observed wandering around on-site. The south fence, which separates the site from several residential yards, is hidden among bushes and is not clearly visible.

The presence of a dog on-site suggests that the fence has been breached and the site may not be completely secure. There is potential on-site exposure to hazardous substances due to the incomplete security of the site.

4. SUMMARY OF FIT ACTIVITIES

FIT activities for this screening site inspection included gathering additional data from agency files and Golden Eagle, discussions with pertinent agency personnel, a site reconnaissance visit, evaluation of the geohydrologic data, and review of mitigation measures. Although remediation work is not evaluated within the HRS for determination of a site's eligibility for inclusion on the National Priorities List, information about the remedial efforts conducted by Golden Eagle was collected and summarized in this report.

FIT members conducted a site reconnaissance visit on March 30, 1989. They were met on-site by Steve Epperson, Corporate Environmental Director for Golden Eagle Refining Co. Although the site was completely surrounded by a chain-link fence, there was a dog wandering around on-site. Mr. Epperson suspected that there may be a hole in part of the south fence that borders the backyards of homes on 212th Street. For this reason, there is potential for on-site exposure to hazardous substances at this site.

Mr. Epperson discussed the refinery operations that had been performed and the locations of various activities on-site, including the on-site monitor wells. FIT took photographs of many of these areas (see Appendix B). For the most part, the refinery was completely removed and the site was bare. We could see portions of the berms from the large tank farm and gravel pads on which some of the newer tanks had been placed. The on-site drainage ditch and control valve was still in place.

Mr. Epperson took us to the northeast corner of the site to see the landfill gas migration control system and blower/flare station. We saw several drums sitting on the asphalt landfill cover which were being used to temporarily store purge water and free product recovered from MW-2. A contractor comes to the site every two weeks to purge the product floating on the water in the well.

Before leaving the site, Mr. Epperson gave FIT four volumes of data and materials, some of which FIT had not located in agency files. The entire site visit took approximately one hour.

In September 1988, FIT conducted an expanded site inspection (ESI) at the Del Amo Hazardous Waste Site. During the Del Amo ESI, two clusters of wells were drilled to characterize the geohydrologic conditions in the area. The Del Amo site is about one-half mile northwest of the Golden Eagle site. Due to the proximity of the two sites, the geohydrologic data from the ESI, in combination with the data (but not the interpretation thereof) from the logs of the wells drilled at Golden Eagle, were used to evaluate the hazardous waste migration potential at the Golden Eagle site.

5. EMERGENCY REMOVAL CONSIDERATIONS

The Golden Eagle Refinery was dismantled and removed in 1985 and 1986. Much of the surficial contamination at this site has been treated or removed. Although the remediation may not have been sufficient to prevent future contaminant releases, there does not appear to be a need for emergency removal at this site.

6. CONCLUSIONS

Golden Eagle Refining Company, Carson, California is located at 21000 South Figueroa Street in a mixed light industrial, commercial, and residential neighborhood. The site was the location of an oil refinery for nearly 40 years.

The wastes generated, stored, or disposed of on-site consisted of tank bottom sludges, waste oil, and refinery wastewater. Only the tank bottom sludges are considered hazardous substances due to the petroleum exclusion in the Comprehensive Environmental Response, Compensation, and Liability Act, Section 101 (14) and (33). Chromium and lead are common constituents of these sludges. Between 1946 and 1970, approximately 50,000 barrels of tank bottom sludges were disposed of in the southern third of the site by a process known as landfarming.

The refinery ceased operations in 1984 and was dismantled and removed in 1985. A great deal of site characterization and mitigation work has been performed by the company in conjunction with the refinery removal. Thirteen monitor wells were drilled on-site. Groundwater samples from these wells indicate that there has been a release of hazardous substances to groundwater from this site. A sample from MW-8, located in the center of the site, contained trans-1,2-dichloroethene and 1,2-dichloroethane in excess of California maximum contaminant levels or recommended action levels. Chlorinated hydrocarbons are not part of the petroleum exclusion. Groundwater samples from MW-6 and MW-7, upgradient of MW-8, have not detected any chlorinated hydrocarbons. Soil samples from a boring in the vicinity of MW-8 contained high levels of 1,1-dichloroethene and methylene chloride down to 40 feet. Samples from eight of the 13 wells contained levels of chromium, lead, or zinc at concentrations greater than the standards for these metals.

Soil samples from MW-5 in the landfarming area showed total petroleum hydrocarbon contamination as high as 4,200 parts per million down to a depth of 65 feet. Lead concentrations greater than the Total Threshold

Limit Concentration of 1,000 parts per million were found in surface soils in parts of the landfarming area.

Mitigation activities on-site included removal of equipment and subsurface structures, biotreatment of hydrocarbon-contaminated soils, and excavation and removal of lead-contaminated soils. The California Department of Health Services is concerned that the groundwater contamination and deep soil contamination has not been fully characterized or mitigated.

Beneath the site, there are three aquifers of concern: the semi-perched aquifer, the Gage aquifer, and the combined Lynwood/Silverado aquifer. Golden Eagle and the Los Angeles Regional Water Quality Control Board maintain that there is a 24 to 26 foot aquitard between the semi-perched and Gage aquifers that will prevent the downward migration of contaminants. A reassessment of the available geohydrologic data, along with new information obtained during the Del Amo Expanded Site Inspection performed by the Environmental Protection Agency's Field Investigation Team one-half mile northwest of Golden Eagle, indicates that the layer between the semi-perched and Gage aquifers is not sufficient to prevent contaminant migration. The Del Amo project also showed interconnection between the Gage and Lynwood/Silverado aquifers at a boring 2.1 miles from Golden Eagle. Therefore, the contaminated semi-perched aquifer is hydraulically interconnected with the drinking water aquifers within three miles of the site.

The Gage and Lynwood/Silverado aquifers are both used as a source of drinking water by the Dominguez Water Company. The nearest well to the site is Dominguez Water Company well #19, located about one-half mile southeast of the site. It draws water from the Lynwood/Silverado aquifer. Well #75 is located 2.5 miles south of the site and draws water from the Gage and Lynwood aquifers. Both wells are mixed into the Dominguez Water Company distribution system that serves about 110,000 people. An alternate source of water is potentially available from the Metropolitan Water Company of Southern California.

Due to the shallow depth to groundwater, the physical state of the waste, the lack of waste containment, high waste quantity and toxicity, and a large groundwater use population, it is not necessary to document an observed release of contaminants to groundwater for this site to be eligible for the National Priorities List.

Surface water is not used as a source of drinking water within 15 miles of this site. Since the early 1960s, surface water drainage from the site has been channeled into an on-site drainage ditch. The discharge from this ditch flowed into the Dominguez Channel which is only used for flood control. The discharge was tested and complied with the National Pollutant Discharge Elimination System permit.

Much of the contaminated surface soil from the site has been treated or removed. However, it is not clear if these actions have been sufficient to prevent release of contaminants to either the surface water or the air.

An evaluation of the Golden Eagle Refining Co., Inc. of Carson, California under the Hazard Ranking System indicates that the site may be eligible for inclusion on the National Priorities List. This conclusion is based on the following Hazard Ranking System factors:

- o There is evidence of contamination in the semi-perched aquifer;
- o Hydraulic interconnection has been documented between the contaminated semi-perched aquifer and the drinking water aquifers within three miles of the site;
- o Large waste quantity and no containment of wastes;
- o High waste toxicity and persistence; and
- o Large groundwater target population.

7. EPA RECOMMENDATION

	<u>Initial</u>	<u>Date</u>
No Further Remedial Action Planned		
Listing Site Inspection	<u>pal</u>	<u>9.20.89</u>
Notes:		

8. REFERENCES

1. Bright and Associates, Environmental Assessment for Demolition of the Golden Eagle Refinery, Carson, CA, March 1985.
2. SCS Engineers, Water Quality Solid Waste Assessment Test Proposal - Golden Eagle Refinery Site, May 1988.
3. Woodward-Clyde Consultants to James E. McNally, CA Dept. of Health Services (DOHS), "Summary of Available Data, Golden Eagle Refinery Property, Carson, California," letter, August 15, 1987.
4. Bright and Associates, Site Characterization and Mitigation Plan for Phase II Demolition of the Golden Eagle Refinery, August 1985.
5. Marshack, Jon B., CA Regional Water Quality Control Board (RWQCB) Water Quality Objectives and Hazardous and Designated Levels for Chemical Constituents, 1985.
6. Bright and Associates to Jim Ross, RWQCB, "Summary of Actions/Mitigations and Outstanding Issues Pertaining to the Golden Eagle Refinery Site and Request for Approval to Install Two Deep Monitoring Wells," letter, June 16, 1986.
7. Smith, Jim, DOHS, to Arthur Homrighausen, Bright and Associates, "Variance for Biological Treatment of Contaminated Soil at the Golden Eagle Refinery." December 26, 1985.
8. Bright and Associates to Jim Ross, RWQCB, letter, "Final Report on Bioaugmentation Treatment at the Golden Eagle Refinery Site, Carson, CA," October 31, 1986.
9. Woodward-Clyde Consultants to James E. McNally, DOHS, "Site Mitigation Work, Golden Eagle Refinery Property, Carson, California," letter, August 31, 1987.
10. Epperson, Steve, Golden Eagle Refining Co., and Karen Johnson, Ecology and Environment, Inc., site inspection, March 30, 1989.
11. Ross, Jim, RWQCB, and Karen Johnson, Ecology and Environment, Inc., telephone conversation, March 3, 1989.
12. Reyes, Adolpho, City of Carson, and Karen Johnson, Ecology and Environment, Inc., telephone conversation, January 18, 1989.
13. Sysit, Pierre, DOHS, and Karen Johnson, Ecology and Environment, Inc., telephone conversation, May 15, 1989.
14. Bright and Associates, to Michael Redemer, Beacon Oil Co., "Lead Sampling Locations," letter, - November, 24, 1986.
15. Bright and Associates, to Hank Yacoub, RWQCB, "Addition of Monitoring Wells at the Golden Eagle Refinery Site, Carson, CA," letter,

August 22, 1986.

16. California Department of Water Resources, Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County: Bulletin 104, 1961.
17. Ecology and Environment - FIT, Del Amo Expanded Site Inspection, work in progress, no date.
18. U.S. Department of Commerce, Environmental Science Services Administration, Environmental Data Service, Climatic Atlas of the United States, 1968.
19. California Department of Water Resources, Watermaster Service in the West Coast Basin, Los Angeles County, July 1, 1986 - June 30, 1987, 1988.
20. Foth, John, Dominguez Water Company, and Chad Eich, Ecology and Environment, Inc., telephone conversation, May 6, 1987.
21. Norouzi, Aaron, Los Angeles County Department of Public Works, Flood Control, and Chad Eich, Ecology and Environment, Inc., telephone conversation, April 20, 1987.
22. U.S. Fish and Wildlife Service, Pacific Coast Ecological Inventory Map - Long Beach, 1981.
23. U.S. Department of Commerce, Rainfall Frequency Atlas of the United States, Technical Paper No. 40, 1983.

APPENDIX A

CONTACT LOG AND REPORTS

CONTACT REPORT

AGENCY/AFFILIATION: DOHS		
DEPARTMENT : Toxic Substances control Division		
ADDRESS/CITY: Long Beach		
COUNTY/STATE/ZIP:		
CONTACT(S)	TITLE	PHONE
1. Pierre Sycit	Project Manager	(213) 590-4910
2.		
E & E PERSON MAKING CONTACT: Karen Johnson		DATE: 1/17/89
SUBJECT: Current Project Activities		
SITE NAME: Golden Eagle Refining Co., Inc.		EPA ID#: CAD060800064

Pierre started as project manager for GER in October '88. Hossein Nassiri and Roberta James were PMs before him. He will send me a summary of activities on site thru 3/87. DOHS is currently working on getting GER to sign a consent order. Previously, GER has been very cooperative, so no one has pushed the legalities. Now, however, GER has been placed on the Bond Expenditure Plan List (State Superfund), so they must go thru the formal procedures and get the Consent Order.

The RWQCB should be receiving quarterly GW analyses from the monitoring wells on-site. Hank Yacoub was the last Project Manager Officer at the Board that Pierre is aware of.

Benzene and As was found in water. Bioremediation of site was completed in 1986. The site was demolished in 1985 and should be leveled. There should be no activity currently on-site.

Pierre's contact w/GER is:
Steve Epperson, Corp. Environment Division
GER Co., Inc. (209) 583-3372

Pierre has no knowledge about the property being sold to Watt Industries.

1/19/89

Asked Pierre why site put on Bond Expenditure Plan (BEP) when city and company think its cleaned up.

Pg 7 of Site Characterization Plan shows contamination in MW-8 (also cited in 1987 HRS package which he will send me) near the underground diesel tanks (center west). Also, no soil sampling was done specifically under the tanks although the folks at DOHS would suspect the possibility of tank leakage. DOHS wants more thorough site characterization.

5/15/89

The state is still having difficulty getting the consent order (CO) signed. The CO will outline how DOHS and GER will work together. First is the RI phase that will address further characterization needs (including further definition of possible groundwater contamination and deeper soil samples). If contamination is found, then it will go to an FS and RAP.

If the PRP will not sign the CO, DOHS will issue a Remedial Action Order. If they still do not comply, then it goes to the state Superfund and the courts. Pierre does not expect it to go that far, because GER has been cooperative in the past. The current problem is the result of both a change in command (new unit chief, negotiated by the old project officer and was not approved by management. The old CO had all provisions by mutual agreement which is NOT acceptable to current management. It also did not specify the additional site characterization needs.

Pierre had no idea when the CO might be signed or when it would turn into an RAO.

CONTACT REPORT

AGENCY/AFFILIATION: City of Carson		
DEPARTMENT : Community Development Office		
ADDRESS/CITY:		
COUNTY/STATE/ZIP: Los Angeles, California		
CONTACT(S)	TITLE	PHONE
1. Adolpho Reyes	Redevelopment Proj. Manager	(213) 830-7600
2.		
E & E PERSON MAKING CONTACT: Karen Johnson		DATE: 1/18/89
SUBJECT: current Site Status		
SITE NAME: Golden Eagle Refinery		EPA ID#: CAD060800064

Site is in Redevelopment Area #1

Site has been fully remediated as far as city is concerned:

1. Refinery was dismantled and removed. Some contaminated soil has been removed. The rest was treated through bioaugmentation. Monitoring wells were installed and are periodically tested.
2. The 7 acre landfill was studied and it was determined that no hazardous materials were present. The landfill was capped and sealed and a methane gas collection system was installed.

Mr. Reyes was positive that this property had never been owned by Watt Industries. The property just north (across Torrance Blvd.) is and maybe the person got the parcels mixed up. GER has contacted several developers about the property, but none are willing to touch it until it gets "a clean bill of health".

CONTACT REPORT

AGENCY/AFFILIATION: Los Angeles Regional Waste Quality Control Board		
DEPARTMENT : Groundwater Section		
ADDRESS/CITY: 107 South Broadway, Los Angeles		
COUNTY/STATE/ZIP: L.A. California 90012		
CONTACT(S)	TITLE	PHONE
1. Jim Ross	Project Manager	(213) 620-4460
2.		
E & E PERSON MAKING CONTACT: Karen Johnson		DATE: 3/6/89
SUBJECT: Board Actions		
SITE NAME: Golden Eagle Refinery		EPA ID#: CAD06080064

The landfill area has been paved for parking and there are gas vents. MW-2 has free product in it, but "they" believe that it is coming from a leaking underground pipe off-site (in street). Low levels of TPH and benzene and other contamination are still on-site. He did not feel that levels were high enough for concern.

The board has no problem approving development on the site, within the restrictions set down in the waste discharge requirements.

CONTACT REPORT

AGENCY/AFFILIATION: LA County Department of Public Works		
DEPARTMENT : Flood Control District		
ADDRESS/CITY:		
COUNTY/STATE/ZIP:		
CONTACT(S)	TITLE	PHONE
1. Aaron Norouzi		(818) 458-4921*
2.		
E & E PERSON MAKING CONTACT: Chad Eich		DATE: 4/20/87
SUBJECT: Dominguez Channel		
SITE NAME: Golden Eagle		EPA ID#: CAD060800064

Dominguez Channel is only used for flood control and storm water run-off.
It is not used for drinking, irrigation, or recreation; nor is it
connected to the sewer.

* Phone number is current 6/7/89, not same as original contract.

CONTACT REPORT

AGENCY/AFFILIATION: Dominguez Water Company		
DEPARTMENT :		
ADDRESS/CITY:		
COUNTY/STATE/ZIP:		
CONTACT(S)	TITLE	PHONE
1. John Foth		(213) 834-2625
2.		
E & E PERSON MAKING CONTACT: Chad Eich		DATE: 5/6/87
SUBJECT: Well #19 (4S/13W-17D01S)		
SITE NAME: Golden Eagle Refinery		EPA ID#: CAD060800064

The well is approximately 1050 feet deep and is screened in 4 zones:

504'-511'
525'-560'
585'-610'
635'-660'

All perforations are in the Silverado Aquifer. The well currently pumps 400 gpm, but will be redeveloped to pump 600-700 gpm.

Well water is blended with other well water and it has been sampled under AB1803 and no water quality problems have been found.

Total population and served = 100,000-110,000 people. Alternate source of drinking water is available from MWD.

Well #75, **FX-9 Wells** is 485' deep,
perforated in 3 zones: 196-214
262-290 (200' sand aquifer)
350-410

Also sampled under AB1803 - no problems.

APPENDIX B

PHOTODOCUMENTATION

FIELD PHOTOGRAPHY LOG SHEET

DATE: 3/30/89

TIME: 10:05AM

DIRECTION:

Northeast

WEATHER:

Clear/Warm

PHOTOGRAPHED BY:

Christine Houston

SAMPLE ID#:

N/A

DESCRIPTION:



Old tank farm area - gravel pad center right. Berm has been scraped of asphalt liner - bioremediation took place inside bermed area

DATE: 3/30/89

TIME 10:05AM

DIRECTION:

Southeast

WEATHER:

Clear/Warm

PHOTOGRAPHED BY:

Christine Houston

SAMPLE ID#:

N/A

DESCRIPTION:



Refinery site in middle ground - land farm area in background. Homes just beyond bushes/fence upper right.
wp/kj/goldeagle/cr-srw-fpls

FIELD PHOTOGRAPHY LOG SHEET

DATE: 3/30/89

TIME: 10:10 AM

DIRECTION:

Southwest

WEATHER:

PHOTOGRAPHED BY:

Christine Houston

SAMPLE ID#:

N/A

DESCRIPTION:

From building site, looking at MW-11 (left) and MW-13D (right).

DATE: 3/30/89

TIME 10:10 AM

DIRECTION:

North

WEATHER:

Clear/Warm

PHOTOGRAPHED BY:

Christine Houston

SAMPLE ID#:

N/A

DESCRIPTION:



Standing at MW-8 at North end of building site. Waste oil tank sat to North.

wp/kj/goldeagle/cr-srw-fpls

FIELD PHOTOGRAPHY LOG SHEET

DATE: 3/30/89

TIME: 10:10 AM

DIRECTION:

Northwest

WEATHER:

Clear

PHOTOGRAPHED BY:

Christine Houston

SAMPLE ID#:

N/A

DESCRIPTION:



Partial berm of tank farm in background. Lower left is beginning of depression left from UST removal that was just west of building site.

DATE: 3/30/89

TIME 10:15 AM

DIRECTION:

West

WEATHER:

Clear

PHOTOGRAPHED BY:

Christine Houston

SAMPLE ID#:

N/A

DESCRIPTION:



Drainage ditch - flow toward bottom - debris gate at upper left. Also had oil absorbent material that water passed through.

wp/kj/goldeagle/cr-srw-fpls

FIELD PHOTOGRAPHY LOG SHEET

DATE: 3/30/89

TIME: 10:15AM

DIRECTION:

East

WEATHER:

Clear

PHOTOGRAPHED BY:

Christine Houston

SAMPLE ID#:

N/A

DESCRIPTION:

Valve to close drainage.



DATE: 3/30/89

TIME 10:15AM

DIRECTION:

South Southeast

WEATHER:

Clear

PHOTOGRAPHED BY:

Christine Houston

SAMPLE ID#:

N/A

DESCRIPTION:



Drainage discharge valve - sampling location for NPDES compliance - bushes
upper right is approximate area that high Pb soil removed.
wp/kj/goldeagle/cr-srw-fpls

FIELD PHOTOGRAPHY LOG SHEET

DATE: 3/30/89

TIME: 10:15 AM

DIRECTION:

North Northeast

WEATHER:

Clear

PHOTOGRAPHED BY:

Christine Houston

SAMPLE ID#:

N/A



DESCRIPTION:

Blacktop landfill cover - blue tower is landfill gas flame.

DATE: 3/30/89

TIME 10:20 AM

DIRECTION:

North

WEATHER:

Clear

PHOTOGRAPHED BY:

Christine Houston

SAMPLE ID#:

N/A



DESCRIPTION:

On right is concrete drainage ditch that parkign lot drains into thru drop in curb (at level of top of black drums).
wp/kj/goldeagle/cr-srw-fpls

FIELD PHOTOGRAPHY LOG SHEET

DATE: 3/30/89

TIME: 10:45 AM

DIRECTION:

North

WEATHER:

clear

PHOTOGRAPHED BY:

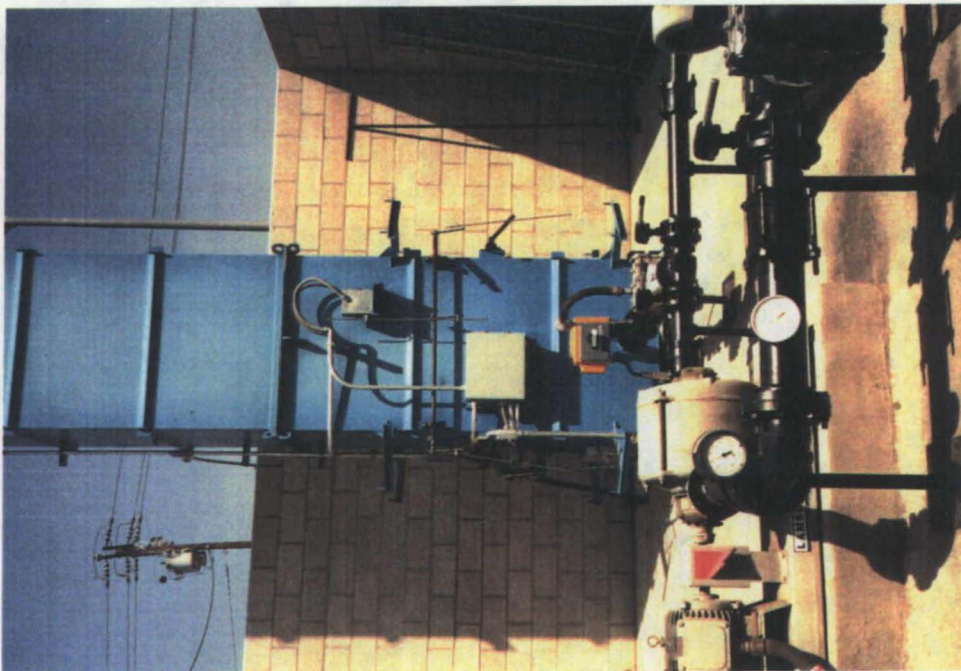
Christine Houston

SAMPLE ID#:

N/A

DESCRIPTION:

Inside landfill gas flaring station.



DATE: 3/30/89

TIME 10:50 AM

DIRECTION:

South

WEATHER:

Clear

PHOTOGRAPHED BY:

Christine Houston

SAMPLE ID#:

N/A

DESCRIPTION:



Rita taking HNu reading of asphalt. (read -0-) Asphalt was not degraded by bacteria and is still mixed in soil in old tank farm area. Long chain HCs are non-migratory and therefore not a real problem (per Epperson).
wp/kj/goldeagle/cr-srw-fpls